

Ron Brown Excellence in Innovation Award



**Gregory Cooksey
Paul Patrone
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National Institute of Standards and Technology

For pioneering the real-time, cell-by-cell analysis required to support early cancer diagnosis, the evaluation of novel therapeutics, and increase the accuracy of clinical decision-making: The team is honored for their groundbreaking invention, the serial cytometer, a breakthrough in flow cell measurements that makes possible multiple measurements of the same cell in sequence, enabling self-validating, time-dependent measurements of cell behavior.

This innovative technology, unveiled in 2022, provided the first-ever quantification of intrinsic errors in cell counting and characterization, enabling a 10,000-fold improvement in detecting rare circulating tumor cells. In a true burst of creativity and development, a humble idea – to increase throughput and understanding of errors – led to a complete overhaul of the field of flow cytometry by achieving two groundbreaking firsts: The automatic measurement of error in cell count and characteristics of biological samples, and the dynamic measurement of cellular enzymatic activity.

The team's exploration and implementation of this revolutionary idea has resulted in several technical advances in cytometry, including flow focusing, fluidic control, light shaping, and signal analysis, and has opened a whole new frontier to cytometry: the dynamic measurement of true cellular processes. The accuracy, throughput, and dynamic measurement provided by the team's invention sets a new standard in medical diagnostics, therapy selection, and basic research and profoundly impacts the field of cytometry across all industries and sectors.

This achievement undoubtedly embodies the spirit of Ron Brown, epitomizing commitment to innovation, creativity, and risk-taking. Starting with a single idea of serial measurements, the team persisted through multiple design iterations to achieve uncertainty assessments on biological samples and dynamic measurements of cellular processes, upending longstanding assumptions in flow cytometry, advancing the National Institute of Standards and Technology's metrology mission, and improving quality of life for all.